

44. (New) A mat according to claim 36, wherein the reinforcement fibers are polyacrylonitrile (PAN) carbon.

45. (New) A mat according to claim 36, wherein the reinforcement fibers are pitch carbon.--

REMARKS

Claims 36-37 and 39-45 are pending in the application.

The above amendment to the specification is as requested by the Examiner in the Office Action, at paragraph 2.

As to the recitation in the amendment above regarding the reinforcement fibers, and as to new claims 43-45, see Applicant's specification as originally filed, e.g., at page 4, lines 5-9; see also the charts on pages 8-9, in the respective "reinforcing fiber" rows. The amendment is for simplifying communication and so that meaningful communication about the Casey survey reference may be had, and is without prejudice to presentation in due course, such as in another application, of other subject matter disclosed in Applicant's specification.

In claim 36, the typographical error "ration" has been corrected, as requested by the Examiner in paragraph 3 of the Office Action.

Anticipation Rejection

At page 2 of the Office Action, Claims 36-37 and 39-40 have been rejected under 35 U.S.C. 102(b) as anticipated by Casey. The Examiner cites pages 1129 (second paragraph) and 1141 of Casey.

Applicant respectfully traverses the anticipation rejection, as follows.

The pages cited by the Examiner from Casey (editor, 1980), are included in chapter 9, "Nonwovens and Papers from Synthetic Fibers" by Heyse, Vice President and Technical Director at The Dexter Corporation. In an introductory paragraph at page 1129, Heyse states, "Oriented products with a 20 to 1 machine-direction tensile orientation are also possible." Applicant's present claims recite reinforcement fibers that are selected from polyacrylonitrile (PAN) or pitch based carbon; glass; para-amid; ceramics; metals/ high-temperature thermoplastics;

thermoplastics; liquid crystal polymer fibers; ultra high molecular weight polyethylene and natural or synthetic spider web. For such fibers, Casey/Heyse discloses no specific actual example with a 20 to 1 machine-direction tensile orientation. Nor can it even be said to which of the many fibers mentioned in the body of the chapter does Casey/Heyse's introductory remark about the possibility of a 20 to 1 machine-direction tensile orientation applies. As Casey/Heyse states (page 1129), "A wide range of fiber types and dimensions have been successfully utilized in wetlay nonwovens. These can be broadly classed into natural pulps, synthetic fibers, and synthetic pulps." In many different contexts, Casey/Heyse mentions a variety of fibers, such as cellulosic fibers (pages 1130, 1140), cyanoethyl cellulose (page 1145), polyolefin-encapsulated cellulose (page 1145), (page 1130), cotton linter pulps (page 1130), grass pulps (page 1130), abaca (pages 1130, 1141), viscose rayon (pages 1130-1131, 1147-1148), acetate rayon (page 1131), short rayon fibers (page 1137), acrylic (page 1131), polypropylene (pages 1131, 1132), polyvinyl alcohol (page 1131), vinyon (pages 1131, 1153), glass (pages 1131-1132, 1145, 1146), ceramic (page 1132), quartz (page 1132), rayon and wood (pages 1140-1141), nylon (page 1141), nylon and wood (page 1141), cellulose acetate and cellulose nitrate (pages 1145-1146), polyester (pages 1146, 1148, 1152), hydroxycellulose (page 1147), acrylonitrile (page 1148), teflon (page 1152), fibrils (pages 1152-1153), as examples of some fibers mentioned in Casey/Heyse. Also, many different production methods are surveyed in Casey/Heyse.

As Applicant stated in his specification, which has the force and effect of a Declaration Under 37 CFR 1.132, before the present invention, "Typical glass mat machines may produce a maximum of 1.4 to 1 machine direction (MD) to cross-machine direction (CD) orientation (58% MD orientation)". (Applicant's specification, page 1, lines 27-29.) Before the present invention, there were a "few machines ... known to orient at a 4 to 1 ratio (80%), while even fewer machines have been known to orient at a 6 to 1 ratio ($6/7 = 85.7\%$)". (Id., lines 30-32.) All attempts prior to the present invention, however, had failed to produce

a 9 to 1 or greater ratio. (Id., page 2, lines 5-6.)

Casey/Heyse's statement about a 20 to 1 ratio is entirely ambiguous about for what fibers this ratio was thought possible, and how to also achieve the basis weight of Applicant's claimed invention. Casey/Heyse does not disclose Applicant's claimed combination of fiber, basis weight and orientation ratio. When Casey/Heyse remarks of a "possible" 20 to 1 ratio, he does not disclose the fiber to which he refers, nor does he disclose a basis weight range. There is evidence that actual work by Heyse's company, Dexter, was below the range of 68 to 339 grams/square meters of Applicant's presently claimed invention. See US Patent 5,786,065 (Dexter Corporation), Table III.

Table III of Dexter's US Patent 5,786,065 (1998) is further instructive because it shows measured MD and CD values. Calculating¹ the orientation of Dexter's Examples, Example 1 has orientation 65% (dry), 66% (wet); Example 2 has orientation 63% (dry), 62% (wet); Example 3 has orientation 73% (dry), 75% (wet) – which are much lower than a 20 to 1 ratio, and that was about 18 years after Heyse's chapter in Casey.

The Examiner relies on pages 1141-1142 of Casey/Heyse, in the section for "Forming of Nonwovens by Wet-Lay Process." Casey/Heyse there begins by discussing a blend of rayon and wood fiber. (Sentence bridging pages 1141-1142.) Heyse identifies a problem, that is solved by disposing certain equipment at an angle. (Top of page 1142.) In the next paragraph, Heyse mentions various angles used by commercial manufacturers. In the next paragraph, which is the part emphasized by the Examiner, Heyse refers to a study of tensile strength ratio as a function of speed differential between the stock and the wire, for a 15 degree angle. In that context, grammage of 15 to 100 grams/square meter is mentioned. There is no report of orientation ratio or MD and CD from which to calculate the same. A mat with the orientation/strength of Applicant's claimed invention is not

¹See the formula at page 2, lines 1-2 of Applicant's specification.

disclosed.

Moreover, the fibers in the analysis mentioned at page 1142 of Casey were a mixture of nylon and wood pulp. (Casey, page 1142, sentence following the data table.) The reinforcement fibers recited in Applicant's present claims are distinguished from the fibers mentioned in the part of Casey relied upon by the Examiner.

Reconsideration and withdrawal of the anticipation rejection are respectfully requested.

Obviousness Rejection

At page 3 of the Office Action, Claims 41-42 have been rejected under 35 U.S.C. 103(a) as unpatentable over Casey in view of Bagg (GB 1,389,539) and Weeks (5,409,573).

Applicants respectfully traverse the obviousness rejection.

For the reasons set forth above, the presently claimed invention is substantially removed from Casey. To a person of ordinary skill in the art, Casey would not disclose or suggest how to actually achieve a 20 to 1 orientation ratio. Nor would a person of ordinary skill in the art who wanted to make, for example, a PAN or pitch based carbon mat, or a glass mat, even refer to page 1141 of Casey (the page relied upon by the Examiner, referring to nylon and wood).

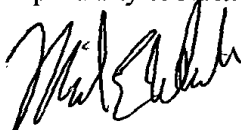
Nor do the cited secondary references supply the substantial deficiencies of Casey. A person of ordinary skill in the art reading Bagg and/or Weeks would not be motivated to modify Casey to arrive at the presently claimed inventive products. Bagg and Weeks each lack disclosure about how to achieve a mat with a particular desired basis weight range and a particular desired high orientation, as in Applicant's claimed invention. Nor does either Bagg or Weeks have any example that discloses or suggests any of Applicant's claimed mats and other products.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 36-37 and 39-45 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephone or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



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